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Idaho Operations Office

Field Sampling Plan for the VES-SFE-20 Hot Waste Tank System at INTEC

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Prepared for the
U.S. Department of Energy
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ABSTRACT

This Field Sampling Plan describes the Waste Area Group 3, Operable Unit 3-13, remedial field sampling activities to be performed at the Idaho Nuclear Technology and Engineering Center located within the Idaho National Engineering and Environmental Laboratory. Field sampling activities described in this plan support the selected response action presented in the *Final Record of Decision for Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13* for the VES-SFE-20 Hot Waste Tank System.

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ACRONYMS

AA	alternative action
ALARA	as low as reasonably achievable
COPC	contaminant of potential concern
CPP	Chemical Processing Plant
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
DOT	Department of Transportation
DQO	data quality objective
DS	decision statement
EPA	Environmental Protection Agency
ESH&QA	environmental, safety, health and quality assurance
FECF	Fuel Element Cutting Facility
FFA/CO	Federal Facility Agreement and Consent Order
FSP	Field Sampling Plan
FTL	field team leader
HASP	Health and Safety Plan
HI	hazard index
ICDF	INEEL CERCLA Disposal Facility
ID	identification
IEDMS	Integrated Environmental Data Management System
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
JSS	job-site supervisor
OSHA	Occupational Safety and Health Administration
OU	operable unit

PEW	process equipment waste
PM	project manager
PPE	personal protective equipment
PSQ	principal study question
QA	quality assurance
QAPjP	Quality Assurance Project Plan
QC	quality control
RAO	remedial action objective
RCT	radiological control technician
RD/RA	remedial design/remedial action
ROD	Record of Decision
SAM	Sample and Analysis Management
SAP	Sampling and Analysis Plan
SFE	Storage Facility Exterior
SRPA	Snake River Plain Aquifer
SVOC	semivolatile organic compound
TAL	target analyte list
UCL	upper confidence limit
UTS	universal treatment standard
VES	vessel
VOC	volatile organic compound
WAC	Waste Acceptance Criteria
WAG	waste area group
WGS	Waste Generator Services
WMP	Waste Management Plan

Field Sampling Plan for the VES-SFE-20 Hot Waste Tank System at INTEC

1. INTRODUCTION

In accordance with the *Federal Facility Agreement and Consent Order* (FFA/CO) (DOE-ID 1991), the Department of Energy (DOE) submits the following remedial action Field Sampling Plan (FSP) for the Idaho National Engineering and Environmental Laboratory (INEEL), Waste Area Group (WAG) 3, Operable Unit (OU) 3-13. Specifically, the remedial action comprises the removal of the Storage Facility Exterior (SFE) -20 Hot Waste Tank System (hereinafter referred to as the VES-SFE-20 tank system).

This FSP provides guidance for the collection of samples needed to support the remediation of the VES-SFE-20 tank system, otherwise known as Chemical Processing Plant (CPP) environmentally controlled site number 69, or CPP-69. See Figure 1-1 for the approximate location of the VES-SFE-20 tank system at the Idaho Nuclear Technology and Engineering Center (INTEC). This plan also addresses characterizing waste soil and debris such that it can be properly managed and disposed in accordance with the *Waste Management Plan for the VES-SFE-20 Hot Waste Tank System* (DOE-ID 2003a). Characterization of the tank and its contents is covered by a separate plan (DOE-ID 2003b). The VES-SFE-20 tank system consists of Building CPP-642, pump pit, an underground access tunnel to the vault, piping, tank and contents, and vault. Building CPP-642 is located just east of the CPP-603 facility.

This FSP is implemented with the latest revision of the *Quality Assurance Project Plan for Waste Area Group 1, 2, 3, 4, 5, 6, 7, 10 and Inactive Sites* (DOE-ID 2002) which provides guidance for sampling, quality assurance (QA), quality control (QC), analytical procedures, and data management. Together, the Quality Assurance Project Plan (QAPjP) and this FSP constitute the remedial action Sampling and Analysis Plan (SAP). The QAPjP describes project objectives and QA/QC protocols that will achieve the specified data quality objectives (DQOs). Use of this FSP will help ensure that data are scientifically valid, defensible, and of known and acceptable quality, while use of the QAPjP will ensure that the data generated are suitable for their intended purposes.

The QAPjP and this FSP have been prepared pursuant to the *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA 1988), the FFA/CO (DOE-ID 1991), and company policies and procedures.

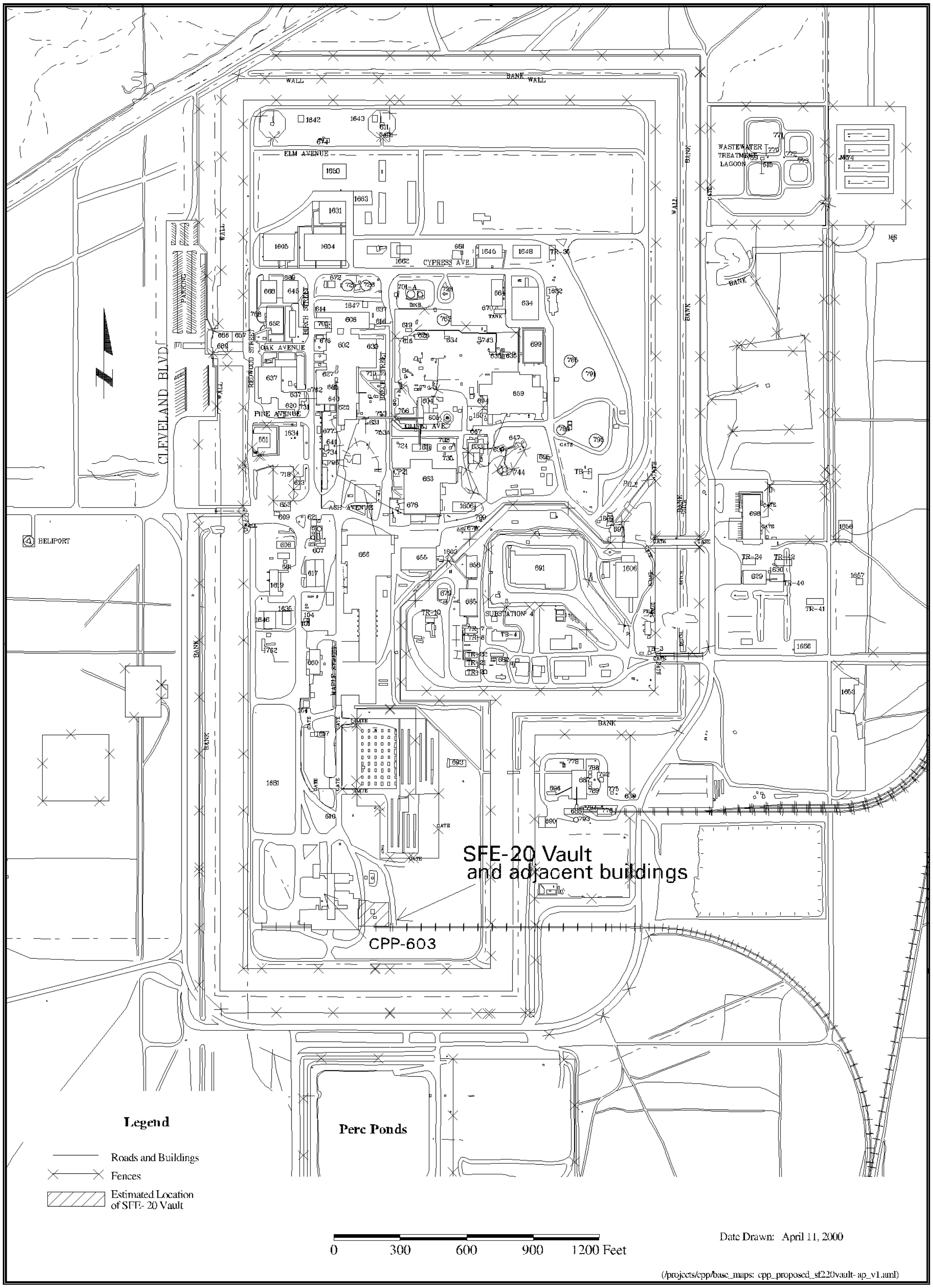


Figure 1-1. Location of VES-SFE-20 tank in WAG 3.

2. PURPOSE AND OBJECTIVES

The purpose of this document is to provide the requirements for performing the field sampling activities for the VES-SFE-20 tank system remedial action. Data gathered through the sampling will be used to manage the wastes in accordance with the Waste Management Plan (WMP) (DOE-ID 2003a) and to assess the risks presented by carcinogenic and noncarcinogenic contaminants as addressed in the Remedial Design/Remedial Action (RD/RA) Work Plan (DOE-ID 2003c). This FSP is also designed to (1) address criteria for obtaining representative samples, (2) maintain sample integrity, and (3) provide appropriate safety considerations for field personnel.

2.1 Scope

The scope of this plan focuses on sampling soil and debris associated with implementing the RD/RA Work Plan for the VES-SFE-20 Hot Waste Tank System. The RD/RA Work Plan identifies the spatial boundaries to be within a line of shoring and to the depth of basalt. Any contamination found above the remedial action objectives (RAOs) that extend beyond the line of shoring will be noted and will be dealt with under the remedial action for Group 3, Other Surface Soils.

2.2 Project Description

This FSP supports the remedial action of the VES-SFE-20 tank system. The remedial action for the VES-SFE-20 tank system will be implemented in two phases. Phase I will consist of removing the tank and its contents, removing all accessible piping including piping that may block removal of the tank and piping with asbestos insulation, and removing loose surface contamination and liquids from the vault floor. Phase II will consist of removing the remaining piping, equipment, components, structures, and contaminated soil. The contents of VES-SFE-20 will be tested in accordance with the Characterization Work Plan for VES-SFE-20 (DOE-ID 2003b). Soil and debris will be sampled and tested in accordance with this FSP.

2.3 Waste Disposition

The OU 3-13 RAOs for VES-SFE-20 tank system are to excavate and dispose of soil that presents an unacceptable risk and to remove and dispose of the tank system components (DOE-ID 1999). The final Record of Decision (ROD) for OU 3-13 recognized the INEEL CERCLA Disposal Facility (ICDF) landfill as the primary disposal option for soil and VES-SFE-20 tank system debris. Depending on the nature and extent of contamination, other disposal options may be considered. Data must be generated to completely characterize the waste so the appropriate management and disposal methods can be carried out and to ensure that the RAOs have been met. VES-SFE-20 tank system waste management and disposal are discussed in further detail in the *Waste Management Plan for the VES-SFE-20 Hot Waste Tank System* (DOE-ID 2003a).

3. VES-SFE-20 TANK SYSTEM

The VES-SFE-20 tank system and its associated pump house (CPP-642) are located east of CPP-603 near the south perimeter of INTEC. The main components of the VES-SFE-20 tank system include (1) the CPP-642 pump house, (2) the pump pit, (3) the access tunnel, (4) the tank, (5) the tank vault, and (6) the tank piping. An isometric drawing of the VES-SFE-20 tank system is provided in Figure 3-1. Electrical service lines essential to the operation of the CPP-603 complex, specifically for power distribution to CPP-1677 (VES-SFE-126) and CPP-648 (VES-SFE-106), are routed through the CPP-642 building.

Further details about the history of the VES-SFE-20 tank system and descriptions of its components are provided in the *Remedial Design/Remedial Action Work Plan for VES-SFE-20 Hot Waste Tank System* (DOE-ID 2003c).

3.1 VES-SFE-20 Tank System Process History and Characterization

The information presented in this section has been summarized from the historical process descriptions and characterization data described in the *Characterization Work Plan for the VES-SFE-20 Waste Tank at INTEC* (DOE-ID 2003b).

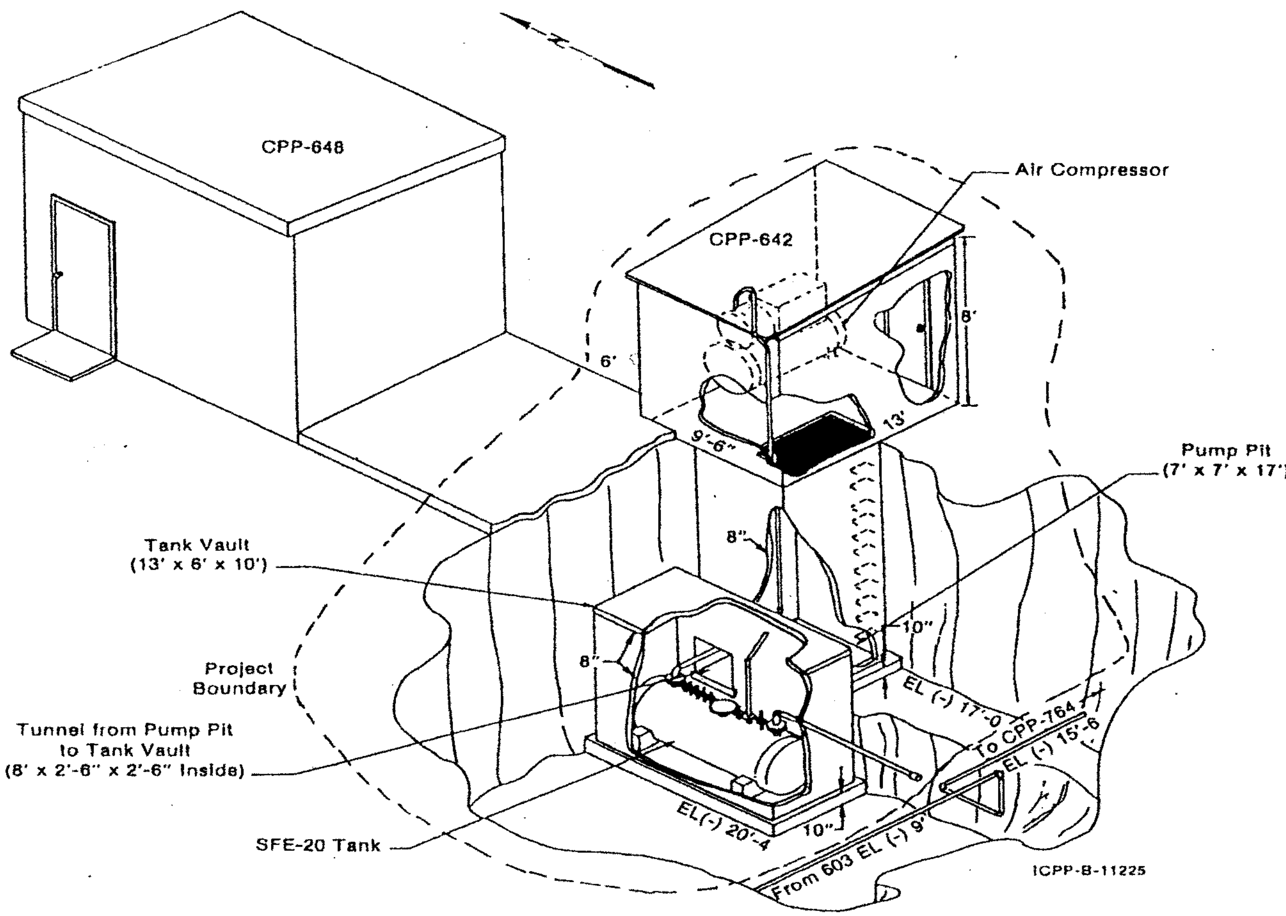
The VES-SFE-20 tank system was installed in 1957 during the construction of the Fuel Element Cutting Facility (FECF) in Building CPP-603. FECF south basin area sent radioactive liquid waste to VES-SFE-20. This facility was used to cut aluminum-clad fuel originating from a test reactor at the Savannah River Facility. The FECF conducted fuel-cutting operations beginning in 1959 and ending in 1962. Liquid waste flowed, by gravity, from the floor drains to VES-SFE-20 and was then pumped for dispositioning to the Process Equipment Waste (PEW) Evaporator Facility. At the conclusion of fuel-cutting activities, acid was added to the tank, and the tank was heated to dissolve fine cuttings in the tank and lines that had passed through the strainers in the floor drains. This solution was then pumped to the PEW facility for treatment. In addition, the tank received backwash water from the filter system that removed contaminants from the basin water. These contaminants included radionuclides from leaking fuel casks. VES-SFE-20 was taken out of service in 1976 and has not been used since. The pump was removed and piping connections were capped.

Several projects to collect data on the VES-SFE-20 tank system were carried out in 1984. Samples from the tank, vault, pump pit, and access tunnel were collected and analyzed. Radiation level measurements of the tank and pump pit were also made. The results of the sampling efforts are presented in Table 3-1.

In addition, five samples were collected from the top 15.2 cm (6 in.) of surface soil above the tank vault. Samples were collected (1) directly above the center of the VES-SFE-20 vault, (2) above the southeast corner, (3) above the southwest corner, (4) above the northwest corner, and (5) above the northeast corner of the vault. The analytical results of these samples are summarized in Table 3-2.

The extent of the contamination, if any, in the soil at various depths around VES-SFE-20 and under the concrete structures is unknown. Soils beneath the vault, tunnel, and pump pit have not been sampled. In addition, it is not known whether releases from sites within close proximity to CPP-69 have impacted the site.

A list of potential contaminants of concern (COPCs) was developed from the existing data and process knowledge and is presented in Table 3-3.



Isometric view of tank vault and pump pit.

Figure 3-1. Isometric view of VES-SFE-20 tank system.

Table 3-1. The 1984 radioisotopic content of smears and samples of VES-SFE-20 area.

Type[a]	Co-60	Cs-137	Cs-134	Eu-152	Eu-154	Eu-155	Sb-125	Sr-90	Pu	U
Smear	—[b]	7.68×10^{2}	—[c]	—[c]	—[c]	—[c]	—[c]	—[b]	—[b]	—[b]
Smear	—[b]	8.97×10^{3}	—[c]	—[c]	—[c]	—[c]	—[c]	—[b]	—[b]	—[b]
Smear	55.4	1.39×10^{4}	59.2	584	570	121	—[c]	—[b]	—[b]	—[b]
Smear	—[d]	2.19×10^{3}	—[d]	—[d]	—[d]	—[d]	—[d]	—[d]	—[d]	—[d]
Smear	1.51	5.84×10^{4}	98.4	1,200	770	204	—[c]	—[b]	—[b]	—[b]
Smear	95.1	4.16×10^{4}	—[c]	—[c]	—[c]	—[c]	—[c]	—[b]	—[b]	—[b]
Liquid	5.83	9.05×10^{2}	1.35	—[c]	—[c]	—[c]	—[c]	—[b]	—[b]	—[b]
Liquid	105	2.48×10^{5}	1.55	—[c]	—[c]	—[c]	—[c]	1.71×10^{5}	1.02×10^{2}	$<1.6 \times 10^{-4}$
Liquid	74.3	2.05×10^{3}	7.76	—[c]	—[c]	—[c]	73.2	9.70×10^{3}	1.76×10^{4}	$<1.6 \times 10^{-4}$
Dry solids	2.15×10^{4}	8.92×10^{6}	1.06×10^{4}	1.5×10^{5}	1.31×10^{5}	4.73×10^{4}	—[c]	1.72×10^{6}	7.92×10^{4}	—[b]
Wet solids	3.27×10^{5}	5.54×10^{7}	1.62×10^{5}	1.21×10^{5}	1.21×10^{5}	—[c]	—[c]	4.70×10^{6}	9.35×10^{4}	1.91×10^{-3}
Wet solids	2.38×10^{4}	2.29×10^{6}	1.33×10^{4}	4.62×10^{4}	4.62×10^{4}	2.05×10^{4}	4.73×10^{4}	5.89×10^{6}	3.01×10^{3}	—[b]
Liquid	—[c]	—[c]	—[c]	—[c]	—[c]	—[c]	—[c]	—[b]	—[b]	—[b]

a. Units of measure: pCi for smears, pCi/gm for solids, pCi/mL for liquids. U was reported in g/L.

b. Analysis was not requested.

c. Isotope below detection limit.

d. Constituent not analyzed.

Table 3-2. Summary of analyses of VES-SFE-20 tank system surface soil samples (pCi/gm).

Sample Number	Cs-137	K-40	Ra-226	Th-232	Alpha (pCi)
1	22.95	17.75	3.22	2.03	0.05
2	4.40	—[a]	3.18	2.80	2.35
3	22.76	—[a]	6.33	2.10	—[b]
4	22.89	31.73	—[b]	—[b]	—[b]
5	34.27	29.05	—[b]	—[b]	—[b]

a. Below detection limit.

b. Analysis not performed. Analyzed only samples expected to show highest concentrations.

Table 3-3. Potential VES-SFE-20 tank system contaminants.

Contaminant Type	Potential Contaminant of Concern
Metals	Cadmium
	Chromium
Volatile organic compounds (VOCs)	Acetone
	Methylene chloride
	1,1,1-trichloroethane
	Tetrachloroethene
	Formaldehyde
Nonvolatile organic compounds	Freon
Polychlorinated biphenyls (PCBs)	
Asbestos	
Acidity	Hydrogen ion (pH)
Radionuclides	Strontium-90
	Cobalt-60
	Cesium-134, -137
	Europium-152, -154, -155
	Antimony-125
	Plutonium-238, -239, -240, -242
	Uranium-234, -235, -238
	Cerium-144
	Zirconium-95
	Americium-241, -243
	Neptunium-237
	Curium-242, -244
	Potassium-40
	Manganese-54
	Niobium-95
	Ruthenium-106
	Iodine-129
	Carbon-14
	Tritium
	Radium-226
	Technetium-99

4. PROJECT ORGANIZATION AND RESPONSIBILITIES

The following sections contain a description, based on job title, of each of the personnel associated with this field sampling project.

4.1 Project Manager/Work Requester

The project manager (PM)/work requestor will ensure that all activities conducted during the project comply with INEEL management control procedures and program requirements documents and all applicable requirements of Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), DOE, Department of Transportation (DOT), and the State of Idaho. The PM coordinates all document preparation, field and laboratory activities, data evaluation, risk assessment, dose assessment, and design activities. The PM is responsible for the overall work scope, schedule, and budget.

The PM is responsible for the field activities and for all personnel (including craft personnel) assigned to work at the project location. The PM will serve as the interface between operations and project personnel and will work closely with the sampling team at the site to ensure that the objectives of the project are accomplished in a safe and efficient manner. The PM will work with all other identified project personnel to accomplish day-to-day operations, identify and obtain additional resources needed at the site, and interact with environment, safety, health, and QA (ESH&QA) personnel on matters regarding health and safety.

4.2 Sampling Coordinator

The INEEL sampling coordinator is responsible to coordinate all sampling activities across the INEEL Site. Upon notification by the PM, the sampling coordinator is responsible to obtain and schedule the necessary resources to complete the sampling task. The sampling coordinator will schedule sampling personnel to complete the task. The sampling coordinator is also responsible to manage and obtain sampling supplies and tools needed to complete the task.

4.3 Field Team Leader/Job-Site Supervisor

The field team leader (FTL) or job-site supervisor (JSS) will be the INEEL representative at the site with responsibility for the safe and successful collection of samples. The FTL/JSS acts as the team leader and works with INEEL facility personnel, ESH&QA personnel, and the field sampling team to manage field sampling operations and to execute the characterization plan. The FTL/JSS enforces site control, documents activities, and may conduct the daily safety briefings at the start of the shift. Health and safety issues may be brought to the attention of the FTL.

If the FTL/JSS leaves the site during sampling operations, an alternate will be appointed to act as the FTL/JSS. The identity of the acting FTL/JSS will be conveyed to sampling personnel at the sampling location, recorded in the logbook, and communicated to the facility representative, when appropriate.

4.4 Samplers

Samplers include all task site personnel assigned to the characterization project to obtain samples for analytical purposes. All samplers, including INEEL, DOE, and subcontractor personnel, must understand and comply with the requirements of this document and other applicable documentation. Sampling personnel will be briefed at the start of each shift by the FTL/JSS regarding the tasks to be performed and the applicable health and safety requirements. During the prejob briefing, work tasks, associated hazards, engineering and administrative controls, required personal protective equipment (PPE), work control documents, and radiological and emergency conditions will be discussed.

Samplers are responsible for identifying any potentially unsafe situations or conditions to the FTL/JSS and applicable ESH&QA representatives for corrective action. If it is perceived that an unsafe condition presents an imminent danger, sampling personnel are authorized to stop work immediately and notify the FTL/JSS of the unsafe condition.

4.5 Waste Generator Services—Waste Technical Specialist

The INEEL Waste Generator Services (WGS) waste technical specialist will ensure disposition of waste material is in compliance with identified guidance. WGS personnel have the responsibility to help solve waste management issues at the task site. Personnel also prepare the appropriate documentation for waste disposal and make the proper notifications, as required. All wastes will be managed and disposed according to the *Waste Management Plan for the VES-SFE-20 Hot Waste Tank System* (DOE-ID 2003a).

4.6 Sample and Analysis Management—Technical Representative

The Sample and Analysis Management (SAM) office technical representative is responsible to help define the analytical project, generate the sampling and analysis plan table, and generate and issue sample labels. The SAM representative will determine which laboratory will provide analytical services based on established policies and contracts and will prepare the task order statement of work. The SAM representative will also track analytical progress and perform cursory review of the final data packages. The SAM representative will obtain independent validation of the data results as project requirements dictate.

4.7 ESH&QA Support

ESH&QA personnel are assigned to the job site to provide resources and expertise to resolve ESH&QA issues. Personnel assigned to provide ESH&QA support must be qualified to recognize and evaluate hazards, environmental concerns, or quality issues according to his or her expertise and will be given the authority to take or direct immediate actions to ensure compliance and protection. ESH&QA personnel assess and ensure compliance with applicable INEEL procedures including this document.

Radiological control support personnel are the source for information and guidance on radiological hazards at the task site. Radiological support personnel may include the radiological control supervisor, radiological control technicians (RCTs), and/or radiological engineers. The RCT is responsible to survey the task site, equipment, and samples and provide guidance for work activities in accordance with the applicable company manuals. The radiological engineer provides information and guidance relative to the evaluation and control of radioactive hazards at the task site, including performing radiation exposure estimates and as low as reasonably achievable (ALARA) evaluations, identifying the type(s) of radiological monitoring equipment necessary for the work, and advising personnel of changes in monitoring and PPE.

4.8 Data Storage Administrator

The data storage administrator is responsible for maintenance of data records. For this sampling plan, the records coordinator for WAG 3 will serve as the data storage administrator.

5. SAMPLING DATA QUALITY OBJECTIVES

The objective of this sampling activity is to obtain technically representative sampling and analysis data for in-place soil and the debris from the VES-SFE-20 tank system remedial action. These data will be used for making decisions with regard to waste characterization and site remedial action goals as defined in the OU 3-13 Record of Decision (DOE-ID 1999). In order to provide support for these objectives, existing process knowledge and analytical data for the tank system and surrounding soil were reviewed. This information was then evaluated following the DQO process (EPA 1994).

5.1 Problem Statement

The purpose of this DQO process is to support decision-making activities as they pertain to the remediation of the VES-SFE-20 tank system. The objective of DQO Step 1 is to use relevant information to clearly and concisely state the problem to be resolved.

There are two basic components to the problem: remediation and waste characterization. Remediation addresses soils remaining in place and overburden/layback soils. Waste characterization addresses the VES-SFE-20 tank system components (i.e., CPP-642 pump house, pump pit, access tunnel, tank vault, piping corridor, and tank piping) and soils exceeding the final remediation goals as identified in the RD/RA Work Plan (DOE-ID 2003c). The data from waste characterization will be used for appropriate waste management and disposal. The problem statements associated with this DQO process step are

- Problem Statement 1 – Remediation: Given that the VES-SFE-20 tank system components will be removed as part of the remedial action and that evidence of releases to the environment may be encountered during removal, collect verification data to determine if contamination remaining at the site will pose an unacceptable risk in comparison to the OU 3-13 remediation goals and remedial action objectives.

- Problem Statement 2 – Waste characterization: Given that the structures, piping, and tank are intended for removal and disposal, collect the required waste characterization data to profile material and to ensure the remedial action objectives and remediation goals are met.

5.2 Decision Statements

The second step in the DQO process identifies the decisions and the potential actions that will be taken based on the data collected. This is done by forming principal study questions (PSQs) and alternative actions (AAs) that could result from resolution of the PSQs and by combining the PSQs and AAs into decision statements (DSs).

The objectives of this FSP are to answer the following questions:

- PSQ #1 – Does soil surrounding the VES-SFE-20 tank system present an unacceptable risk, as defined by exceeding a cumulative carcinogenic risk of 1×10^{-4} or a cumulative hazard index (HI) of 1 for noncarcinogenic contaminants for current and future users and the Snake River Plain Aquifer (SRPA)?

- PSQ #2 – Do sufficient data exist to characterize remediation waste including the VES-SFE-20 tank system components and debris, and the soil that exceeds the remediation goals?

Given the PSQs developed for the VES-SFE-20 tank system and surrounding soils, the associated DSs are as follows:

- DS #1 – Determine if concentrations of contaminants of concern in the soil around and underlying the VES-SFE-20 tank system exceed the remediation goals.
- DS #2 – Collect and analyze representative samples of the wastes for which insufficient data are available to make waste characterizations.

5.3 Decision Inputs

The third step in the DQO process is to identify the informational inputs required to resolve the decision statements and to determine which of those inputs require measurements.

5.3.1 Information Required to Resolve Decision Statements

Table 5-1 specifies the information (data) required to resolve each of the decision statements identified in Section 5.2 and identifies whether these data already exist. For the data that are identified as existing, the source references for the data have been provided with a quality assessment as to whether the data are of sufficient quality to resolve the corresponding decision statement. The qualitative assessment of the existing data was based on the evaluation of the corresponding quality control data (e.g., spikes, duplicates, and blanks), method detection limits, data collection methods, etc.

Table 5-1. Required information and reference sources.

DS #	Remediation Variable	Required Data	Does Data Exist?	Source Reference	Sufficient Quality?	Additional Information Required?
1	Radiological activity and chemical concentrations	Field screening and laboratory measurements of potential contaminants	N	—[a]	—[a]	Y
2	Radiological activity and chemical concentrations	Laboratory measurements of potential contaminants	N[b]	—[a]	—[a]	Y

a. Not applicable at this time.
b. Sampling of SFE-20 hot waste tank contents is scheduled to be conducted in 2005. Data from the tank contents sampling will be used for waste profiling activities for waste associated with the SFE-20 Hot Waste Tank System process.

5.3.2 Computational and Survey/Analytical Methods

Table 5-2 identifies the decision statements where data do not exist or are of insufficient quality to resolve the decision statements. Computational and/or surveying/sampling methods that could be used to obtain the required data are presented in Table 5-2. For Decision Statement 1, analytical data will be collected to determine the 95% upper confidence limit (UCL) value or maximum. For Decision Statement 2, analytical data will be collected to determine the average concentration of contaminants. These data will be used for the purposes of excess risk analysis and waste characterization for Decision Statements 1 and 2, respectively.

Table 5-2. Information required to resolve the decision statements.

DS #	Remediation Variable	Required Data	Computational Methods	Survey/Analytical Methods
1	Radiochemical and chemical	Contamination levels of excavated and remaining soils	Compare 95% UCL or maximum to remediation goals	Radiological survey instrumentation and analytical laboratory determination of radionuclides and chemical concentrations
2	Radiochemical and chemical	Contamination levels of VES-SFE-20 system components and soils exceeding remediation goals	Compare mean to waste limits for facility	Analytical laboratory determination of radionuclides and chemical concentrations

5.3.3 Analytical Performance Requirements

Table 5-3 defines the analytical performance requirements for the data that need to be collected to resolve the decision statements. These performance requirements include the practical quantitation limit, precision, and accuracy requirements for each of the contaminants.

Table 5-3. Analytical performance requirements.

Analyte List	Survey/Analytical Method	Preliminary Action Level	Practical Quantitation Limit (PQL)	Precision Requirement	Accuracy Requirement
Decision Statement #1					
Gamma emitters	Gamma survey	≥5 mrem/hr	See RadCon Manual	± 30%	70-130
	Gamma spectroscopy	≥23 pCi/g	0.1 pCi/g	± 20%	80-120
Decision Statement #2					
Gamma emitters	Gamma spectroscopy	Refer to disposal site Waste Acceptance Criteria (WAC)	See QAPjP	± 20%	80-120
Alpha emitters	Alpha spectroscopy	Refer to disposal site WAC	Refer to disposal site WAC	Refer to disposal site WAC	Refer to disposal site WAC
Beta emitters	Liquid scintillation and/or gas flow proportional counting	Refer to disposal site WAC	Refer to disposal site WAC	Refer to disposal site WAC	Refer to disposal site WAC
Universal treatment standard (UTS) metals	SW-846	—[a]	—[a]	± 30%	70-130
VOCs	SW-846	—[a]	—[a]	—[a]	—[a]
Semivolatile organic compounds (SVOCs)	SW-846	—[a]	—[a]	—[a]	—[a]
Freon-12 and -22	SW-846	—[a]	—[a]	—[a]	—[a]
Formaldehyde	SW-846	—[a]	—[a]	—[a]	—[a]
PCBs	SW-846	—[a]	—[a]	—[a]	—[a]
Asbestos	SW-846	—[a]	—[a]	—[a]	—[a]

a. Addressed in SW-846.

5.4 Study Boundaries

The fourth step in the DQO process is to determine the spatial and temporal boundaries of the study. The spatial boundaries define the physical extent of the study area; they may be subdivided into specific areas of interest. The temporal boundaries define the duration of the entire study or specific parts of the study. The appropriate outputs of this step are a detailed description of the spatial and temporal boundaries of the problem and a discussion of any practical constraints that may interfere with the study.

The spatial boundaries of the study area are described in RD/RA Work Plan (DOE-ID 2003c) as being within the line of shoring of the excavation and to the depth of the basalt. If contaminated soil is found to extend beyond the line of shoring, it will be recorded and later removed as part of the OU 3-13, Group 3, Other Surface Soils, remedial action.

The temporal boundaries of the study include the projected date that the remedial action for VES-SFE-20 tank system will be implemented and the duration of time to complete the remedial action. These temporal boundaries are in the process of being defined.

5.5 Decision Rule

The fifth step in the DQO process is to (1) define the parameters of interest that characterize the population, (2) specify the action level, and (3) integrate previous DQO outputs into a single statement that defines the conditions that would cause the decision-maker to choose among AAs (see Table 5-4). The decision rule typically takes the form of one or more "If…then" statements describing the action or actions to take if one or more conditions are met. The decision rule must be specified in relation to a parameter that characterizes the population of interest.

Table 5-4. Decision rules.

DS#	DR#	Decision Rule
1	1	***If*** the soil surrounding the VES-SFE-20 tank system does not meet the OU 3-13 RAOs, as defined by achieving a cumulative carcinogenic risk of 1×10^{-4} or a cumulative HI of 1 for noncarcinogenic contaminants to current and future users, ***then*** the soil must be removed and managed in accordance with the WMP (DOE-ID 2003a) and RD/RA Work Plan (DOE-ID 2003c).
1	2	***If*** the soil surrounding the VES-SFE-20 tank system does meet the RAOs, ***then*** the soil may be reused which may include using the soil as backfill for the excavations.
2	3	***If*** the estimated mean concentration for a contaminant calculated from laboratory analyses of VES-SFE-20 system components and soils exceeding remediation goals exceed the ICDF WAC, then alternative disposal options will be investigated.

5.6 Decision Error Limits

The sixth step in the DQO process is to minimize uncertainty in the data by specifying tolerable limits in the design errors. Since analytical data can only estimate the true condition of the site under investigation, decisions based on measurement data could potentially be in error (i.e., decision error). For this reason, the primary objective of this step is to determine which DSs, if any, require a statistically based sample design. Determining the decision error limits specifies the decision-maker's tolerable limits on decision errors, which are used to establish performance goals for the data collection design.

Two types of decision errors can occur for characterization of soils and debris contained in the VES-SFE-20 site:

- Determining that the contaminated soil possesses an acceptable risk when, in fact, this is not true, or
- Determining from the characterization of the waste that no contaminants are present above a disposal facility's WAC levels when, in fact, they are above that level.

Though the consequences for each decision error must be considered, the first decision error offers the more severe consequence, as the error could result in human health and/or ecological impacts. To protect against the above errors, quantitative laboratory analyses of the regulated constituents will be performed on the wastes. As Decision Statements 1 and 2 are not based on a statistical sampling design, the decision error limits are based on professional judgment. Therefore, statistical error limits are not used in the determination of sampling locations or frequency.

5.7 Design Optimization

The last step in the DQO process is design optimization. The objective of this step is to present alternative data collection designs that meet the minimum data quality requirements specified in DQO Steps 1 through 3. A selection process is then used to identify the most resource-effective data collection design that satisfies all of the data quality requirements.

5.7.1 Phase I - Characterization Approach

Phase I of the remedial action for SFE-20 tank system consists of (a) excavating down to the top of the tank vault, (b) removing the tank and its contents, (c) removing all accessible piping including piping that may block removal of the tank and piping with asbestos insulation, and (d) removing loose surface contamination and liquids from the tank vault and pump pit floor. Waste characterization activities to be performed during the Phase I remedial action includes the following:

- Characterization of excavated soil to determine its fate as backfill material or as waste for disposal
- Characterization of debris to determine proper waste management and disposal
- Characterization of loose contamination to determine proper waste management and disposal.

The following sections identify the sample numbers, types, and locations to be collected. A summary of the characterization strategy for the SFE-20 tank system and soils is presented in Table 5-5.

5.7.1.1 ***Phase I - Soil Characterization.*** Radiological surveys (conducted by the RCT for worker protection) will also be used to screen the soil as it is excavated from ground surface down to the top of the SFE-20 vault. If radiological screening indicates the soil does not present an unacceptable risk to worker safety (a dose rate <5 mrem/hr or as otherwise dictated by the RCT), the soil will be stockpiled for use as backfill material. If radiological screening indicates a dose rate >5 mrem/hr (or as otherwise dictated by the RCT), the soil will be segregated into a separate waste pile. The waste pile will be characterized by collecting two composite samples and analyzing for contaminants of potential concern as described in Section 6 (Table 6-1) to meet the ICDF WAC. To ensure representative samples are obtained from the waste pile, a minimum of five sub-samples will be collected from each bucket load of soil prior to placement in the waste pile or container. All sub-samples will be containerized for future collection of two composite samples. Two VOC grab samples will be collected from the final waste pile at a minimum of 6 in. below the surface at two discreet locations. If soil is containerized, the VOC grab samples will be collected from randomly selected containers. The waste pile will then be managed in accordance with the RD/RA Work Plan and the WMP.

Table 5-5. Summary of characterization strategy for SFE-20 tank system and soils.

Characterization Phase/Media	Number and Type of Samples	Notes
Phase I - Soil Characterization	Two composite samples	Collected if screening indicates soil is >5 mrem/hr on contact
Phase I - Debris Characterization	Screened using gamma spectrometry	Used to segregate debris
	Characterized using process knowledge	Used to estimate hazardous constituents
Phase I - Loose Contamination	Two sets of two composite samples	If free liquids and/or solids are present in pipes, on the bottom of the pump pit, or tank vault
Phase I - Potential Asbestos-Containing Materials	Up to two tests on piping insulation	If positive for asbestos, will handle subsequent material as containing asbestos
Phase II - Upper Region Soil Characterization	Two composite samples	If gamma spectrometry (GS) screening indicates that Cs-137 >23 pCi/g *and* if no previous samples were collected during Phase I
Phase II - Lower Region Soil Characterization	Two to four composite samples	Collected if screening indicates soil is >5 mrem/hr on contact
	Two sets of two composite verification samples (four samples)	Collected after removal of all tank system components
Phase II - Debris Characterization	Screened using GS	Used to segregate debris
	Characterized using process knowledge	Used to estimate hazardous constituents

5.7.1.2 Phase I - Debris Characterization. Potential debris waste generated during Phase I includes piping, concrete, and ancillary materials associated with the vault, tunnel, pump pit, pipe corridor, and CPP-642 pump house. The OU 3-13 RAOs for the SFE-20 tank system require all materials associated with the tank system be removed and disposed. The SFE-20 tank characterization results will be used to manage the debris in accordance with the RD/RA Work Plan and the WMP. As debris are excavated, they will be segregated into two groups: nonprocess group and process group.

5.7.1.2.1 Nonprocess Group Debris—The nonprocess group debris represents the materials that did not come into contact with hazardous materials and were not used in the waste transfer process. The nonprocess group will be screened for radiological contamination using gamma spectrometry (GS) to determine radioactive contamination concentration. If GS results indicate a portion of the nonprocess group is contaminated, it will be added to the process group. If GS results indicate a portion of the nonprocess group is not contaminated, it will be managed in accordance with the RD/RA Work Plan and the WMP. The nonprocess group will be assessed for hazardous constituents (specifically, metals content) using design knowledge to calculate the hazardous metal content and then be managed in accordance with the RD/RA Work Plan and the WMP. The evaluation may consist of reviewing design specifications and design documents.

5.7.1.2.2 Process Group Debris—The process group debris represents materials that were used for the transferring of process waste to the tank, routing acid to the tank, or sampling the tank or are debris considered to be contaminated based on process knowledge. Contamination on the process group will be characterized using analytical data from the VES-SFE-20 tank sampling event (tank sediment characterization result). This approach will assume a thickness of residue on the inside bottom half of the pipes and assume the residue contains the same concentration of contaminants found in the tank sediment. A total mass amount of the contaminants would be determined from the concentration of each contaminant and the geometry (diameter and length) of the pipe. This approach could lead to conservatively high approximations of the waste constituents. The process group will be assessed for hazardous constituents (specifically, metals content) using process knowledge to calculate the hazardous metal content and then be managed in accordance with the RD/RA Work Plan and the WMP.

5.7.1.3 Phase I - Loose Contamination Characterization. Free liquids and/or solids may be present in pipes and on the bottom of the pump pit and the tank vault. A solidification agent will be used to absorb the liquid and produce a solid material that is free of liquids. If one or the other materials exists in one or more locations, the material will be combined, only if similarity in the waste source or proximity to waste source is deemed appropriate, and a composite sample consisting of two grab samples will be collected for each type of waste (e.g., liquid in the pump pit may be sampled separate from liquid present in the piping). If both materials exist in one or more locations, separate composite samples consisting of two grab samples each will be collected, one for analyzing the free liquids and one for solids. The samples will be collected and analyzed for the contaminants of potential concern as described in Section 6 (Table 6-1).

5.7.1.4 Potential Asbestos-Containing Materials. Some materials encountered during characterization activities may contain asbestos materials such as the roofing material for CPP-642, which has been identified as being constructed from a transite (potential asbestos-containing material). In lieu of sampling, transite materials will be managed as asbestos-containing materials in accordance with the WMP.

Certain pipes in the SFE-20 tank system are also believed to be covered with insulation containing asbestos. If process knowledge or previous sampling data indicate the presence of asbestos, the materials will be handled as asbestos-containing material in accordance with the WMP. If no process knowledge or previous sampling data are available, the insulation material will be tested for asbestos. If results confirm the presence of asbestos, all subsequent insulation material will be handled as asbestos-containing material in accordance with the WMP.

5.7.2 Phase II - Characterization Approach

Phase II consists of removing the remaining piping, equipment, components, structures, and soil associated with VES-SFE-20. The Phase II soil characterization is divided into the *upper region soil* and *lower region soil*, based on location relative to the tank vault and pump pit.

5.7.2.1 Phase II - Upper Region Soil Characterization. Phase II upper region soil is defined as soil excavated to the depth of the tank vault base, including the soil returned to the excavation at the end of Phase I. Soil that presents an unacceptable risk will be managed and disposed of in accordance with the RD/RA Work Plan and the WMP; otherwise, the soil will be reused as backfill following the removal of the tank system.

Soil will be excavated in *lifts* measuring up to 5 ft in depth. The first lift will be removed, stockpiled, and screened using GS. If a GS screen indicates that Cs-137 is less than 23 pCi/g, the soil will be staged for use as backfill material. If the GS screen indicates that Cs-137 is greater than 23 pCi/g, then it will be assumed this soil in the upper region contains the same waste characteristics as was determined during Phase I. If no soil was previously sampled and analyzed during Phase I (i.e., all Phase I soil was <5mrem/hr), then two composite samples will be collected from each lift and analyzed per Section 6 (Table 6-1). A minimum of 10 sub-samples will be collected from each lift of soil. The soil area will be divided into two sections with sample locations at each section's center and corners. Two grab samples for VOC analysis will be collected from each lift at least 6 in. below the surface and as close to the center of the lift as possible. The process of excavating lifts and screening for Cs-137 will continue until the bottom of the vault and pump pit is reached.

5.7.2.2 Phase II - Lower Region Soil Characterization. The Phase II lower region soils are located beneath the pump pit and the tank vault and extend downward to basalt. The lower region soil characterization is designed to determine if releases from the tank vault and pump pit contaminated the underlying soil and, if releases had occurred, determine if the soil presents an unacceptable risk to the SRPA (verification sampling). It is anticipated that sampling will occur following removal of all the components of the tank system.

Radiological surveys and/or a field screening measurements for Cs-137 will be used as an indicator of contamination. If results indicate dose rates are greater than 5 mrem/hr or if the corresponding concentration level for the indicator is exceeded based on characterization data, then a lift of soil up to 4 ft in depth will be excavated. Two composite samples will be collected from the lift and analyzed to COPCs listed Section 6 (Table 6-1). An iterative process of excavating and sampling lifts will continue until radiological screening levels are acceptable or until bedrock is reached.

When radiological surveys indicate dose rates less than 5 mrem/hr, two sets of composite verification samples will be collected under the vault and pump pit and analyzed for COPCs listed in Section 6 (Table 6-1). If results for the analyses indicate that COPCs do not exceed the ROD's RAOs, the remediation will be considered complete. If results indicate that the COPCs exceed the ROD's RAOs, then the soil will be managed per the WMP.

5.7.2.3 Phase II - Debris Characterization. Characterization of debris in Phase II will be similar to the process described in Phase I. As debris are excavated, they will be segregated into two groups: process group and nonprocess group. The process group is the material known or thought to be contaminated (e.g., concrete from inside the vault, piping used for transferring process waste). The nonprocess group represents the materials that at no time contained hazardous materials or were used to transfer process waste. The nonprocess group will be screened for radiological contamination using GS and characterized for other hazardous constituents (i.e., metals) using process knowledge. Nonprocess group waste will be managed in accordance with the RD/RA Work Plan and the WMP.

Contamination of the process group will be characterized using analytical data from the VES-SFE-20 tank sampling event (tank sediment characterization result). This approach will assume a thickness of residue on the inside bottom half of the pipes and assume the residue contains the same concentration of contaminants found in the tank sediment. A total mass amount of the contaminants will be calculated from the concentration of each contaminant and the geometry (diameter and length) of the pipe. The amount of other hazardous constituents (i.e., metals) on the process group will also be estimated using process knowledge. Process group waste will then be managed and disposed of in accordance with the RD/RA Work Plan and the WMP.

6. DESIGN BASIS

The basis for the design of this FSP is to facilitate the remedial actions identified within the RD/RA Work Plan for VES-SFE-20 Hot Waste Tank System, which are to identify soil that presents an external exposure risk or threat to groundwater and to characterize the components of the VES-SFE-20 tank system so they can be properly managed and disposed in accordance with the RD/RA Work Plan (DOE-ID 2003c) and the WMP (DOE-ID 2003a). The design approach is to obtain representative samples of soil and debris wastes and have these samples analyzed for COPCs. The contaminants, presented in Table 6-1, are based on the contaminants identified in the Characterization Work Plan (DOE-ID 2003b) as revised to eliminate those constituents not necessary for the DQOs of this FSP. However, the list will be modified based on the results from the tank characterization sampling. For example, COPCs that are nondetectable will be eliminated from further consideration.

Table 6-1. Contaminants of potential concern for VES-SFE-20 tank system[a].

Chemical/Other	Radionuclides [b, c, d]
Universal Treatment Standard (UTS) metals [a, b, c]	Tritium (H-3)
Appendix IX (40 CFR 264) target analyte list (TAL) VOCs (including acetone, methylene chloride, 1,1,1-trichloroethane, tetrachloroethene, and trichloroethylene) [a, b, c]	Carbon-14
	Sodium-22
	Potassium-40
Appendix IX (40 CFR 264) TAL semivolatile organic compounds (SVOCs) [a, b, c]	Manganese-54
	Cobalt-60
Freon-12 and -22 (dichlorodifluoromethane and chlorodifluoromethane) [a]	Strontium-90
	Niobium-95
Formaldehyde [a, b]	Zirconium-95
PCBs [a, b, c]	Technetium-99
Asbestos [b]	Ruthenium-106
	Antimony-125
	Iodine-129
	Cesium-134, -137
	Cerium-144
	Europium-152, -154, -155
	Radium-226
	Uranium-234, -235[e], -238
	Neptunium -237
	Plutonium-238, -239, -240, -241, -242
	Americium-241, -243
	Curium-242, -244

a. The list of COPCs will be modified based on the data results from the CWP.

b. Soil, tank vault, and pump pit.

c. Piping.

d. Absorbed water.

e. U-236 is reported with U-235.

Tables 6-2 and 6-3 identify the data quality categories and analytical methods and Table 9-1 (Section 9.2.2) presents the sampling bottles, preservation types, and holding times for samples being collected under this FSP. For more details concerning this information, see the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2002).

Table 6-2. Data quality summary table for the soil and debris wastes.

	Measurement of Concern	Analytical Data Category	Data Use
Radiological analysis	Gamma spectroscopy Co-60; K-40; Cs-134, -137; Eu-152, -154, -155; Sb-125; Ce-144; Ra-226; Zr-95; Mn-54; Nb-95; Na-22; Ru-106 Alpha isotopic U-234, -235, -238; Pu-238, -239, -240, -242; Am-241, -243; Np-237; Cm-242, -244 Beta isotopic Sr-90, H-3, C-14, I-129, Tc-99, Pu-241	Definitive	Characterization, management of materials and disposal options
Metals	UTS	Definitive	Characterization, management of materials, closure plan certification and disposal options
Organics	Appendix IX TAL VOCs Appendix IX TAL SVOCs	Definitive	Characterization, management of materials, closure plan certification and disposal options
Miscellaneous	Freon-12 and -22 (dichlorodifluoromethane and chlorodifluoromethane) Asbestos PCBs Formaldehyde	Definitive	Characterization, management of materials and disposal options

Table 6-3. Analytical methods for each COPC.

Constituent	Analytical Method	Solids Detection Limits
UTS metals	EPA Methods 1311, 3010A, 7760A, 6010B, and 7470A	0.2-1000 mg/kg depending on metal
Appendix IX TAL VOCs (including acetone, methylene chloride, 1,1,1-trichloroethane, tetrachloroethene, and trichloroethylene)	EPA Method 8260B	5-100 ug/kg depending on VOC (must meet UTS detection limits for those analytes in parentheses)
Appendix IX TAL SVOCs	EPA Method 8270C	660-3300 ug/kg depending on SVOC
Freon (dichlorodifluoromethane and chlorodifluoromethane)	EPA Method 9071B	10 ug/kg
PCBs	EPA Method 8082	350 ug/kg
Asbestos	—[a]	Present Y/N
Formaldehyde	NIOSH Method 3500	1 mg/kg
Tritium	Liquid scintillation counting (LSC)	20 pCi/g
Carbon-14	LSC or gas flow proportional (GFP)	3 pCi/g
Strontium-90	GFP	0.5 pCi/g
Technetium-99	LSC or GFP	1 pCi/g
Iodine-129	Low energy photon spectrometry (LEPS) or GFP	1 pCi/g
Radium-226	Gamma spectrometry (GS) or GFP	0.5 pCi/g
Neptunium-237	Alpha spectrometry (ALS)	0.05 pCi/g
Uranium isotopes	ALS	0.05 pCi/g
Plutonium isotopes	ALS	0.05 pCi/g
Plutonium-241	LSC	1 pCi/g
Americium-241, -243	ALS	0.05 pCi/g
Curium isotopes	ALS	0.05 pCi/g
Gamma emitters	GS	~0.1 pCi/g

a. Contact the on-Site Analytical Laboratories Department for analysis method.

7. SAMPLE DESIGNATION

Samples will be identified with a unique code and arranged in a SAP table and database.

7.1 Sample Identification Code

A systematic character identification (ID) code will be used to uniquely identify all samples. Uniqueness is required to maintain consistency and prevent the same ID code from being assigned to more than one sample.

The first designator of the code, 1, refers to the sample originating from WAG 3. The second and third designators, RA, refer to the sample being collected in support of the remedial action. The next three numbers designate the sequential sample number for the project. Regular and field duplicate samples will be designated with a two-character set (e.g., 01, 02). The last two characters refer to a particular analysis.

For example, a soil sample collected in support of the remedial action might be designated as 1RA00101R4, where (from left to right):

- **1** designates the sample as originating from WAG 3.
- **RA** designates the sample as being collected for the remedial action.
- **001** designates the sequential sample number.
- **01** designates the type of sample (01 = regular, 02 = field duplicate).
- **R4** designates gamma spectrometric analysis.

The Integrated Environmental Data Management System (IEDMS) database will be used to record all pertinent information associated with each sample identification code. Preparation of the plan database and completion of the SAM request for services are used to initiate the sample and sample waste tracking activities performed by the SAM.

7.2 Sample and Analysis Plan Table/Database

The following sections describe the information recorded in the SAP tables.

7.2.1 Sample Description Fields

The sample description fields contain information relating individual sample characteristics.

7.2.1.1 Sampling Activity. The sampling activity field contains the first six characters of the assigned sample number. The sample number in its entirety will be used to link information from other sources (field data, analytical data, etc.) to the information in the SAP tables for data reporting, sample tracking, and completeness reporting. The analytical laboratory will also use the sample number to track and report analytical results.

7.2.1.2 Sample Type. Data in this field will be selected from the following:

REG	for a regular sample
QC	for a QC sample.

7.2.1.3 *Matrix.* Data in this field will be selected from the following:

Soil	for soil samples
Water	for QA/QC samples.

7.2.1.4 *Collection Type.* Data in this field will be selected from the following:

GRAB	for grab
COMP	for composite
FBLK	for field blanks
RNST	for rinsates
DUP	for duplicate samples.

7.2.1.5 *Planned Date.* This date is related to the planned sample collection start date.

7.2.2 Sample Location Fields

This group of fields pinpoints the exact location for the sample in three-dimensional space, starting with the general "Area," narrowing the focus to an exact location geographically, and then specifying the "Depth" in the depth field.

7.2.2.1 *Area.* The "Area" field identifies the general sample-collection area. The field should contain the standard identifier from the INEEL area being sampled.

7.2.2.2 *Location.* The "Location" field may contain geographical coordinates, x-y coordinates, building numbers, or other location-identifying details, as well as program-specific information, such as a borehole or well number. Data in this field will normally be subordinated to the "Area." This information is included on the labels generated by the SAM to aid sampling personnel.

7.2.2.3 *Type of Location.* The "Type of Location" field supplies descriptive information concerning the exact sample location. Information is this field may overlap that in the location field, but it is intended to add detail to the location (e.g., native soil, vault wall, pit floor, tank cradle).

7.2.2.4 *Depth.* The "Depth" of a sample location is the distance in feet from surface level or a range in feet from the surface.

7.2.3 Analysis Type

The "Analysis Type" (i.e., "Analysis Type" 1 through 20) fields indicate analytical types (radiological, chemical, hydrological, etc.). Space necessary to clearly identify each type is provided at the bottom of the form. A standard abbreviation should also be provided, if possible.

8. SAMPLING PRACTICES

ALARA principles will be used during the sampling activity because of the radiological contamination and radiation levels in the tank vault. Radiation levels of the samples may require equipment and instrumentation that will help maintain a distance between the sampler and the sample containers. Radiological Control personnel will be updating information on contamination and radiation levels prior to the sampling activity.

Work controls will be developed and will undergo approvals. Once the appropriate administrative controls are in place, PPE and other equipment would be brought to the site. The zones of control will be roped off and marked in accordance with the Health and Safety Plan (HASP) (INEEL 2003). Health and safety systems will be established, including air supply lines and any special monitoring equipment, as required.

8.1 Personal Protective Equipment

ALARA principles will be used during the sampling activity because of the radioactive contamination and radiation levels in the tank vault.

Prior to being disposed, all PPE will be characterized based on soil sample and field screening results, and a hazardous waste determination will be made as per the requirements set forth in 40 CFR 262.11.

8.2 Sample Location Surveys

Samples taken from excavated soil piles shall be recorded as to the source of the soil pile. If sampling conditions warrant collecting samples from an excavation, sample location points will be recorded and surveyed to establish horizontal (northing and easting coordinates) and vertical (elevation referenced to mean sea level) control.

Horizontal (H) and vertical (V) control will be consistent with standard third-order accuracy, where:

H = 1/5,000 or 5 seconds of arc

V = 0.05 feet per M (length of loop in miles).

8.3 Sample Screening

Prior to releasing samples collected from radioactively contaminated areas, the RCT will survey the external surfaces of all such samples for contamination and perform a radiation survey to determine whether the sample container meets the release criteria for unrestricted use. Samples will also need to be characterized to determine the concentration of radionuclides present and the hazardous material classification for shipping purposes. This determination is usually made by the RadCon organization. All samples will be shipped to the laboratories by a company-certified hazardous materials shipper in accordance with DOT regulations and current INEEL policy.

8.4 Field Decontamination

Field decontamination procedures are designed to prevent cross-contamination between locations and samples and prevent off-Site contaminant migration. All equipment associated with sampling will be thoroughly decontaminated prior to daily activities and between sample locations. Following decontamination, sampling equipment will be wrapped in foil to prevent contamination from windblown dust.

8.5 Handling and Disposition of Sampling Waste

Waste streams generated as a result of the sampling may include (but not be limited to) PPE, sample supplies and equipment, decontamination water (which may be used in small quantities during sampling), sample preparation materials, and excess or spent samples. All waste streams that are generated as a result of the sampling activities will be managed in accordance with the *Waste Management Plan for the VES-SFE-20 Hot Waste Tank System* (DOE-ID 2003a).

8.6 Waste Minimization and Segregation

Waste minimization for the project will be primarily achieved through design and planning to ensure efficient operations that minimize unnecessary waste generation. As part of the prejob briefing, an emphasis will be placed on waste reduction philosophies and techniques, and personnel will be encouraged to continuously attempt to improve methods. No one will use, consume, spend, or expend equipment or materials thoughtlessly or carelessly. Practices to be instituted to support waste minimization include, but are not limited to, the following:

- Restricting material (especially hazardous material) entering radiological buffer areas to those needed for performance of work
- Substituting recyclable items for disposable items
- Reusing items when practical
- Segregating contaminated from uncontaminated waste
- Segregating reusable items such as PPE and tools.

9. DOCUMENTATION MANAGEMENT AND SAMPLE CONTROL

Section 9.1 summarizes document management and sample control. Documentation includes field logbooks used to record field data and sampling procedures, photographic documentation, chain-of-custody forms, and sample container labels. Section 9.2 outlines the sample handling and discusses chain-of-custody, radioactivity screening, and sample packaging for shipment to the analytical laboratories.

9.1 Documentation

The FTL will be responsible for controlling and maintaining all field documents and records and for ensuring that all required documents will be submitted to the Administrative Records and Document Control Office at the conclusion of the project.

Sample documentation, shipping, and custody procedures for this project are based on EPA-recommended procedures that emphasize careful documentation of sample collection and sample transfer. The appropriate information pertaining to each sample will be recorded in a logbook on a chain-of-custodies form. All personnel involved with handling, managing, or disposing of samples will follow INEEL policies and procedures.

A document action request is required when field conditions dictate making any change to this FSP, the project HASP, or project procedures (e.g., requiring additional analyses to meet appropriate WAC).

All information recorded on project documentation will be made in permanent ink. All errors will be corrected by drawing a single line through the error and entering the correct information; all corrections will be initialed and dated. In addition, photographs will be taken to document the field sampling activities.

9.1.1 Sample Container Labels

Waterproof, gummed labels generated by the SAM technical representative will display information such as the sample ID number, the name of the project, sample location, depth, and requested analysis type. In the field, label information will be completed and placed on the containers before samples are collected. Sample date, time, preservative used, field measurements of hazards, and the sampler's initials will be recorded during field sampling.

9.1.2 Field Guidance Forms

Field guidance forms, provided for each sample location, will be generated by the SAM IEDMS database to ensure unique sample numbers. Used to facilitate sample container documentation and organization of field activities, these forms contain information regarding the following:

- Media
- Sample identification numbers
- Sample location
- Aliquot identification

- Analysis type
- Container size and type
- Sample preservation methods
- Field logbooks.

In accordance with the Administrative Records and Document Control format, field logbooks will be used to record information necessary to interpret the analytical data. The FTL, or designee, will ensure by periodic inspection that the field logbooks are being maintained in accordance with the current accepted practices. The field logbooks will be submitted to the project files at the completion of field activities.

9.1.3 Sample Logbooks

Sample logbooks used by the field teams will contain such information as the following:

- Physical measurements (if applicable)
- All QA/QC samples
- Shipping information (e.g., collection dates, shipping dates, cooler ID number, destination, chain-of-custody number, and name of shipper)
- Location of samples
- Media sampled
- Volume of media sampled
- Names of individuals performing the sampling.

9.1.4 Field Team Leader's Daily Logbook

A project logbook maintained by the FTL will contain a daily summary of the following:

- All team activities
- Problems encountered
- Visitors
- List of work site contacts.

This logbook will be signed and dated by the FTL or designee at the end of each day's sampling activities.

9.2 Sample Equipment and Handling

Analytical samples for laboratory analyses will be collected in precleaned bottles and packaged according to American Society for Testing and Materials or EPA-recommended procedures. The QA/QC samples will be included to satisfy the QA/QC requirements for the field operation as outlined in the QAPjP (DOE-ID 2002). Qualified (SAM-approved) analytical and testing laboratories will analyze these samples.

9.2.1 Sample Equipment

Included below is a tentative list of necessary equipment and supplies. This list is as extensive as possible, but not exhaustive, and should only be used as a guide. Other equipment and supplies specified in the project-specific HASP are not included in this section. Field sampling and decontamination supplies may include the following:

- Stainless-steel hand augers
- Power auger
- Tape measure (30.5 m [100 ft])
- Stainless steel spoons
- Stainless steel composting pans
- Paper wipes
- Plastic garbage bags
- De-ionized water (20 L [5.3 gal] minimum)
- Nonphosphate-based soap
- Isopropanol
- Spray bottles
- Aluminum foil
- Certified ultrapure water (5 L [1.3 gal] JT Baker)
- Sample and shipping logbook
- FTL logbook
- Controlled copies of the QAPjP, HASP, and applicable referenced procedures
- Black-ink pens
- Black ultrafine markers
- Sample containers
- Preprinted sample labels and field guidance forms

- Nitrile or latex gloves
- Leather work gloves
- Ziploc plastic bags
- Custody seals.

Sample preparation and shipping supplies include the following:

- pH paper
- Nitrile or latex gloves
- Paper wipes
- Clear tape
- Strapping tape
- Resealable plastic bags (such as Ziploc), in various sizes
- Chain-of-custody forms
- Shipping request forms
- Names, addresses, telephone numbers, and contact names for analytical laboratories
- Task order statements of work for analytical laboratories and associated purchase order numbers
- Vermiculite or bubble-wrap (packaging material)
- Plastic garbage bags
- Blue Ice
- Coolers
- "This Side Up" and "Fragile" labels
- Address labels
- Sample bottles and lids
- Custody seals.

9.2.2 Sample Containers

Table 9-1 identifies container volumes, types, holding times, and preservative requirements that apply to all samples being collected under this FSP. All containers will be precleaned (typically certified by the manufacturer) using the appropriate EPA-recommended cleaning protocols for the bottle type and sample analyses. Extra containers will be available in case of breakage, contamination, or if the need for additional samples arises. Prior to use, preprinted labels with the name of the project, sample identification number, location, depth, and requested analysis will be affixed to the sample containers.

Table 9-1. Sampling bottles, preservation types, and holding times.

Analysis	Volume and Type	Preservative	Holding Time
UTS metals	Glass or plastic	4°C	180 days for all metals except mercury which is 28 days
Appendix IX[a] TAL VOCs (including acetone, methylene chloride, 1,1,1-trichloroethane, tetrachloroethene, and trichloroethylene)	Glass	4°C	14 days
Appendix IX[a] TAL SVOCs	Glass	4°C	14 days
Freon (dichlorodifluoromethane and chlorodifluoromethane)	Glass	4°C	14 days
Formaldehyde	Glass	4°C	14 days
PCBs	Glass	4°C	14 days
Asbestos[b]		NA[c]	NA
Alpha radionuclides	High-density polyethylene (HDPE)	NA	180 days for all isotopes
Beta radionuclides	HDPE	NA	180 days for all isotopes except I-129 which is 28 days
Gamma emitters	HDPE	NA	180 days for all isotopes

a. 40 CFR 264.

b. Contact on-site Analytical Laboratories Department for container requirements.

c. NA = not applicable.

9.2.3 Sample Preservation

Samples will be preserved in a manner consistent with the QAPjP (DOE-ID 2002). If cooling is required for preservation, the temperature will be checked periodically prior to shipment to certify adequate preservation for those samples that require temperatures of 4°C (39°F) for preservation. Ice chests (coolers) containing frozen reusable ice will be used to chill samples in the field after sample collection, if required.

9.2.4 Chain-of-Custody

Custody seals will be placed on all shipping containers to ensure that tampering or unauthorized opening will not compromise sample integrity. The seal will be attached in such a way that opening the container requires the seal to be broken. Clear plastic tape will be placed over the seals to ensure that the seals are not damaged during shipment. Seals will be affixed to containers before the samples leave the custody of the sampling personnel.

Sample bottles will be stored in a secured area accessible only to the field team members.

9.2.5 Transportation of Samples (On-Site and Off-Site)

An on-Site shipment is any transfer of material within the perimeter of the INEEL. Site-specific requirements for transporting samples within Site boundaries and those required by the shipping/receiving department will be followed. Shipments within the INEEL boundaries will conform to DOT requirements. Off-Site sample shipments will be coordinated with INEEL Packaging and Transportation personnel, as necessary, and will conform to all applicable DOT and EPA sample handling, packaging, and shipping methods.

10. REFERENCES

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DOE-ID, 2002*, Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10 and Inactive Sites*, DOE/ID-10587, Rev. 7, U.S. Department of Energy Idaho Operations Office, September 2002.

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